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Emerging competencies for school leadership in basic education: A bibliometric analysis

Competencias emergentes para el liderazgo escolar en la educación básica: un análisis bibliométrico

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Abstract

The aim of this study was to analyze the evolution, structure, and main thematic clusters of the literature on the development of capabilities among school leaders in basic education. To this end, a descriptive bibliometric analysis and thematic mapping were conducted based on 35 PDF files. After removing three duplicates, 32 unique records were examined, of which 14 studies were eligible because they addressed school leadership or management and competencies related to management, digital skills, socioemotional development, innovation, or artificial intelligence. Temporal evolution, language, geographical distribution, authorship, methodological design, source dispersion, and domain co-occurrence were analyzed. The results show that 64.3% of the studies were published between 2024 and 2026, while 71.4% were published in English. The 14 studies appeared in 14 different journals and involved 39 distinct authors, with an average of 2.79 authors per article, suggesting that the field remains fragmented. The most frequent domains were pedagogical leadership and strategic leadership and innovation (64.3% each), followed by communication and collaboration, as well as data and decision-making (57.1% each). To a lesser extent, digital competence and artificial intelligence (42.9%), emotional intelligence (28.6%), and ethics, equity, and inclusion (21.4%) stood out. The thematic network revealed a stronger convergence among strategic leadership, pedagogical leadership, decision-making, and digital competence. In conclusion, the emerging competencies of school leaders constitute a hybrid profile in which technical skills are integrated with instructional

leadership, strategic judgment, relational capacities, and ethical governance. Nevertheless, gaps persist in longitudinal evidence, specialized instruments, and Latin American research, particularly in public basic education.

Keywords: school leadership, leadership competencies, digital competence, artificial intelligence, emotional intelligence.

Resumen

El objetivo de este estudio fue analizar la evolución, la estructura y los principales conglomerados temáticos de la literatura sobre el desarrollo de capacidades de los líderes escolares en la educación básica. Para ello, se realizó un análisis bibliométrico descriptivo y un mapeo temático a partir de 35 archivos PDF. Tras eliminar tres duplicados, se examinaron 32 registros únicos, de los cuales 14 estudios resultaron elegibles por abordar el liderazgo o la gestión escolar y competencias relacionadas con la gestión, lo digital, lo socioemocional, la innovación o la inteligencia artificial. Se analizaron la evolución temporal, el idioma, la distribución geográfica, la autoría, el diseño metodológico, la dispersión de fuentes y la coocurrencia de dominios. Los resultados muestran que el 64,3% de las investigaciones se publicó entre 2024 y 2026, mientras que el 71,4% fue difundido en inglés. Los 14 estudios aparecieron en 14 revistas distintas y reunieron 39 autores diferentes, con una media de 2,79 autores por artículo, lo que sugiere que el campo aún se encuentra fragmentado. Los dominios más frecuentes fueron el liderazgo pedagógico y el liderazgo estratégico e innovación (64,3% cada uno), seguidos de la comunicación y la cooperación, así como de los datos y la toma de decisiones (57,1% cada uno). En menor medida, destacaron la competencia digital y la inteligencia artificial (42,9%), la inteligencia emocional (28,6%) y la ética, la equidad y la inclusión (21,4%). La red temática evidenció una mayor confluencia entre el liderazgo estratégico, el liderazgo pedagógico, la toma de decisiones y la competencia digital. En conclusión, las nuevas competencias de los líderes escolares configuran un perfil híbrido, en el que las habilidades técnicas se articulan con el liderazgo instruccional, el juicio estratégico, las capacidades relacionales y la gobernanza ética. No obstante, persisten brechas en la evidencia longitudinal, los instrumentos especializados y la investigación latinoamericana, especialmente en la educación básica pública.

Palabras clave: liderazgo escolar, competencias de liderazgo, competencia digital, inteligencia artificial, inteligencia emocional.

Introduction

Digital transformation, the expansion of artificial intelligence (AI), data analytics, and growing social complexity have progressively displaced the image of the school principal as a predominantly administrative manager. In contemporary education systems, leading a school requires the integration of strategic vision, pedagogical leadership, innovation capacity, evidence-informed decision-making, and relational competencies capable of mobilizing teachers, students, and families. This transition is particularly evident in recent studies on digital leadership, leadership professionalization, emotional intelligence, and AI governance (DeMatthews et al., 2026; Tømte, 2024; Venter et al., 2024).

Within this competency framework, the development of competencies provides a flexible basis for integration. It is not only about knowing how to use digital resources; it is also about understanding change, leading transformation, identifying risks, committing to lifelong learning, addressing complex issues, and building trusted relationships. The data analyzed show that successful leadership is not a single skill: instructional leadership is associated with critical thinking and problem-solving skills (Ayub et al., 2025); emotional intelligence supports educational leadership roles (Mugabekazi et al., 2026; Venter et al., 2024); and the technological competence of school leaders promotes improved administration through the strategic use of technology, security, and content creation (Nimkrathok & Boonchan, 2026).

Leadership now faces a new set of expectations related to artificial intelligence. Educational leaders need to consider the consequences of automation and personalization. Concerns include privacy, fairness, transparency, assessment, and institutional accountability. DeMatthews et al. (2026) capture this transition through six leadership categories for AI, while Hsieh (2026) shows that generative systems may help assess leadership qualities, although with score patterns that differ from those of human evaluators. Thus, AI literacy for educational leaders is less about the adoption of technology and more about professional judgment and ethical governance.

Although the literature is expanding, the field remains theoretically fragmented. The terms used in studies—such as professional digital competence, 21st-century skills, management competencies, instructional leadership, emotional intelligence, and inclusive leadership—refer to capacities that overlap considerably in practice. Publications are also dispersed across journals, countries, and methodological traditions. Latin America has

contributed studies on managerial competencies and digital management (Huapaya et al., 2023; Vega-Armas & Romero-Carazas, 2024), but evidence specifically focused on school leaders in basic education remains less developed than research on teachers or higher education.

Therefore, a descriptive bibliometric study, reinforced by thematic mapping, is appropriate in this context because it makes it possible to identify not only how much is being published, but also how knowledge is structured, which competencies are most recurrent, and which conceptual connections organize the subject. As noted by Donthu et al. (2021), bibliometric research can integrate performance indicators with science-mapping methodologies. The present study is informed by this approach but limits its inferences to the metadata and content provided in the documentary corpus.

The general objective was to analyze the evolution, bibliometric structure, and thematic configuration of scientific production on emerging competencies among school leaders in basic education between 2017 and 2026. Specifically, the study sought to: (a) characterize production by year, language, region, authorship, source, and methodological approach; (b) identify the most recurrent competency domains; (c) examine co-occurrence relationships among these domains; and (d) identify research gaps and priorities for an agenda applicable to contemporary school management.

Methodology

A documentary review with descriptive bibliometric analysis and thematic mapping was conducted. The selection process was organized according to transparency criteria inspired by PRISMA 2020 (Page et al., 2021), while the bibliometric indicators followed the distinction between scientific performance and thematic mapping proposed by Donthu et al. (2021). The study was not designed to meta-analytically estimate effect sizes or to causally compare interventions; its purpose was to describe the structure and trends of the available scientific corpus.

Documentary corpus and eligibility criteria

The initial corpus comprised 35 PDF files provided for the review. Deduplication was performed by checking file identity and title/DOI matches, which identified three exact duplicates. This process yielded 32 unique records. Titles, abstracts, and, when necessary, full texts were reviewed. The unit of inclusion was a scientific article substantively related to principals, school leaders, or school management teams and to emerging competencies applicable to basic or compulsory education.

Table 1

Selection criteria and variables analyzed

Component	Applied criterion	Rationale
Document type	Scientific article, review, or conceptual study with full text available.	Ensure sufficient information for metadata, methods, and thematic content.
Time frame	2017–2026.	Capture immediate antecedents and the recent acceleration associated with digitalization and AI.
Population/focus	Principals, school leaders, management teams, or leadership in basic/compulsory education.	Align the unit of analysis with the study title and objective.
Construct	Managerial, digital, 21st-century, socioemotional, innovation, AI, inclusion, strategy, or decision-making competencies.	Represent the multidimensional nature of emerging competencies.
Exclusion	Studies focused exclusively on students, teachers without a leadership variable, higher education/health, or technology without school leadership.	Prevent adjacent fields from distorting the thematic structure of the corpus.
Indicators	Year, language, region, source, authorship, design, sample/context, thematic domains, and co-occurrences.	Combine bibliometric description with conceptual mapping.

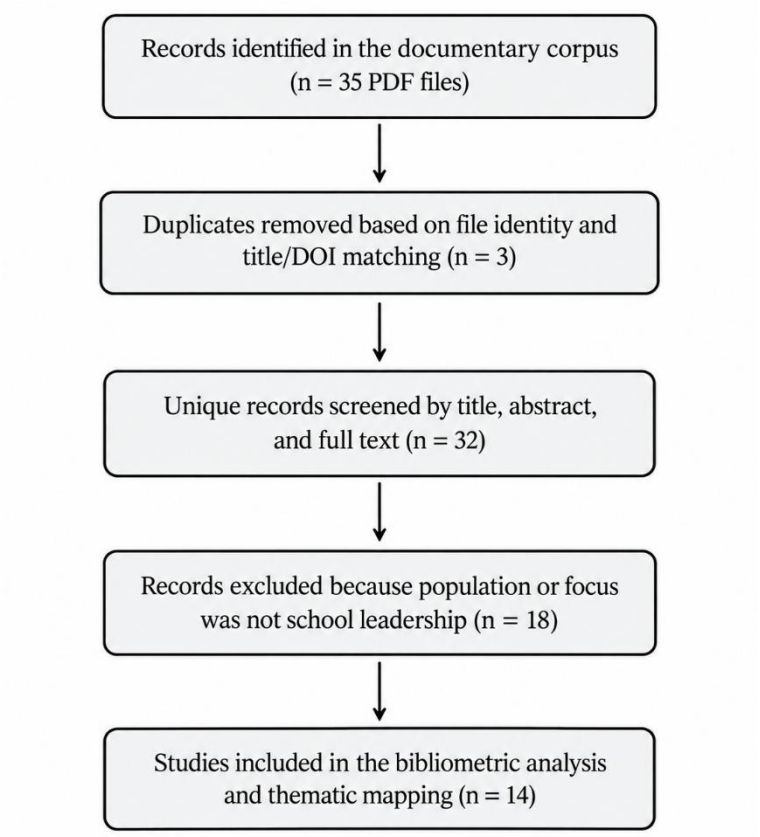
Note. The criteria were applied to the available documentary corpus. Citation and co-citation indicators were not calculated because a Scopus/Web of Science export file containing cited references was not available

Study selection

Of the 32 unique records, 18 were excluded because they did not correspond to the unit of analysis. The exclusions fell into four main groups: competencies of university students; teacher competencies without a school-leadership component; management in higher-education or health institutions; and educational-technology studies without a leadership focus. The final analytical corpus therefore comprised 14 articles. The complete list of excluded records and the reason for each exclusion are reported in Table 2.

Figure 1

Documentary corpus selection flow diagram



Note. The flow was prepared from the 35 PDF files supplied. Exclusion by focus was determined after examination of titles, abstracts, and, when necessary, full texts

Records excluded after thematic screening

For transparency, Table 2 reports the 18 unique records that did not enter the final analytical corpus. Exclusion was based on the predefined unit of analysis and does not imply a negative judgment regarding the scientific quality of these publications.

Table 2
Records excluded after thematic screenin

Record	Main reason for exclusion
Exploring the application of academic leadership skills in teacher education institutions: Philippines…	Management/leadership in teacher-education institutions rather than basic education.
Digital competencies and artificial intelligence literacy among university students	University student population.
Digital competence and artificial intelligence (DigCompIA)	Instrument aimed at secondary-school students rather than school leaders.
SmartPD: a design-based research model	Teacher professional development rather than school leaders.
Digital transformation and educational management: impact of emerging technologies on managerial decision-making	Higher-education leaders.
Systematization of Management Models of Digital Transformation of the Education Sector	Sector-level/general management without a specific focus on basic-education school leaders.
Technology integration in pedagogical processes… primary school teachers in Turkey	Teacher population.
Core competencies and qualifications of health sciences school managers	Management of health-sciences schools/faculties.
Teachers' digital competence in the post COVID-19 era…	Teacher population; leadership only as a contextual variable.
Teachers' digital competencies and their relationship with autonomous learning in upper secondary education	Teacher competencies.
Development of managerial skills in educational institutions	Predominant focus on higher-education institutions.
Pedagogical Competencies in the Age of Artificial Intelligence	Teachers' pedagogical competencies.
Technological competencies among higher-education students	University student population.
Impact of emerging technologies on teaching performance in technological higher education	Teachers in technological higher education.
Emerging technologies in STEM education: A bibliometric analysis…	Educational technology/STEM without a school-leadership focus.
Generative Artificial Intelligence in education: Models, Frameworks and…	Teacher digital competence/K–12 curriculum, not school leaders.
Use of Artificial Intelligence among Students in Pedagogical Higher Education	Students in pedagogical higher education.
Pedagogical competencies for the age of artificial intelligence…	Teacher competencies rather than school-leader competencies.

Data extraction, normalization, and analysis

For each study, a matrix was constructed containing authorship, year, journal, DOI, language, country or study context, methodological design, sample or unit of analysis, competency focus, and main finding. Thematic terms were normalized to avoid semantic fragmentation across languages. For example, digital competence, professional digital competence, and equivalent digital-competency labels were integrated into the domain "Digital competence and AI," while instructional leadership and pedagogical leadership were grouped under "Pedagogical leadership." Coding was multilabel, meaning that a single study could be assigned to more than one domain.

The analysis included frequencies and percentages, the mean number of authors per document, the proportion of multi-authored papers, journal dispersion, temporal evolution, regional distribution, and a domain co-occurrence network. The network connected two domains whenever both appeared in the same article; edge weight represented the number of co-occurrences. Calculations were performed using Python, pandas, and NetworkX, and visualizations were produced with Matplotlib. This approach made it possible to reproduce the indicators from the coding matrix without attributing impact metrics that were not present in the original documents.

Results

The 14 included studies span 2017–2026 and comprise a combination of empirical research, systematic reviews, and conceptual contributions. Thirty-nine unique authors were identified, with no author recurring across documents, yielding a mean of 2.79 authors per article. Ten papers (71.4%) were multi-authored, and four (28.6%) were single-authored. The articles were published in 14 different journals, meaning that no source contributed more than one document. This pattern suggests an interdisciplinary field that remains weakly consolidated in terms of stable author communities and core publication outlets.

Table 3

Profile of the included studies

ID	Author(s) / year, context	Source	Design and sample	Competency focus	Main finding
S1	Crisol-Moya et al. (2022, Spain)	Journal of New Approaches in Educational Research	Cross-sectional quantitative 25 schools; 631 families	Inclusive leadership and family participation	Distributed/pedagogical leadership supports inclusive practices; broader family and community participation remains necessary.
S2	Rauseo et al. (2023, Switzerland)	Technology, Knowledge and Learning	Quantitative; two surveys 202 management staff + 1,739 teachers; 62 schools	Digital transformation and school leadership	School leaders and teachers perceive digital transformation differently; strategy, leadership, pedagogical support, and culture require alignment.
S3	Ayub et al. (2025, Indonesia)	Journal of Education and e-Learning Research	Cross-sectional quantitative 196 school principals	Instructional leadership and 21st-century competencies	Instructional leadership contributes significantly to 21st-century competencies; vision, critical thinking, and problem solving are particularly salient.
S4	Tømte (2024, Norway)	Computers & Education	Qualitative-conceptual with empirical evidence Two empirical studies of leadership in 1:1 schools	Professional digital competence of school leaders	School leaders' digital competence integrates administrative and pedagogical leadership, infrastructure, security, strategy, and development of teacher competence.
S5	Vega-Armas & Romero-Carazas (2024, Latin America)	Revista Tecnológica-Educativa Docentes 2.0	Systematic review 15 articles (2019–2023)	Managerial competencies in educational institutions	Strong managerial competencies are associated with leadership, strategic thinking, learning management, teamwork, and institutional climate.
S6	Mugabekazi et al. (2026, International)	Cogent Education	PRISMA systematic review 18 studies (2020–2025)	Emotional intelligence and educational leadership	Emotional intelligence strengthens transformational, instructional, and distributed leadership; development is more effective when integrated into continuing education and supportive policies.

S7	DeMatthews et al. (2026, United States / K–12)	Educational Management Administration & Leadership	Conceptual synthesis with practitioner validation Six-domain AI leadership framework	Leadership for AI in schools	Proposes six domains integrating strategic vision, instructional innovation, ethical governance, equity, and stakeholder engagement for AI integration.
S8	Montoya (2017, Venezuela)	Revista Scientific	Phenomenological qualitative 3 principals/teachers in primary-school management roles	Managerial competencies and emotional intelligence	Weaknesses in leaders' emotional skills were identified; their relevance to decision-making, trust, collaboration, and institutional leadership was emphasized.
S9	Huapaya et al. (2023, Peru)	Horizontes. Revista de Investigación en Ciencias de la Educación	Quantitative correlational-causal 101 educators	Digital competence and school management	Digital competencies and school management significantly influence teacher performance; the model explained 17.8% of the variance.
S10	Nimkrathok & Boonchan (2026, Thailand)	Human Behavior, Development and Society	Quantitative with regression 327 participants (24 administrators, 303 teachers)	Digital competence of primary-school administrators	Technology use, security, and content creation predicted 55.1% of school-management effectiveness; strategic tool use was the strongest predictor.
S11	Venter et al. (2024, South Africa)	The International Journal of Educational Organization and Leadership	Quantitative correlational 75 school principals	Emotional intelligence and instructional leadership	Emotional intelligence was positively associated with instructional supervision, curriculum coordination, and monitoring of student progress.
S12	Hsieh (2026, Taiwan)	Journal of Advanced Computational Intelligence and Intelligent Informatics	Comparative assessment study 131 aspiring/in-training principals	AI-based assessment of leadership competencies	ChatGPT showed more conservative and standardized scoring patterns than human evaluators, with moderate-to-high reliability; complementary rather than substitutive use is recommended.
S13	Abunaser et al. (2025, Oman)	Frontiers in Education	Qualitative; semistructured interviews 50 Ministry of Education experts	Core competencies for school leaders	Educational leadership, strategic planning, problem solving, relationships, and communication were prioritized, with emphasis on continuing professional development.
S14	Villa (2019, Spain / international review)	Revista de Investigación Educativa	Thematic review Synthesis of leadership models and studies	Leadership, innovation, and educational change	Situational, transformational, effective-practice, and emotional models converge on the central role of leadership in promoting innovation and school improvement.

Table 4

Descriptive bibliometric indicators of the corpus

Indicator	Result	Interpretation
Included documents	14	Specialized corpus after deduplication and thematic screening.
Period	2017–2026	Marked growth in the most recent years.

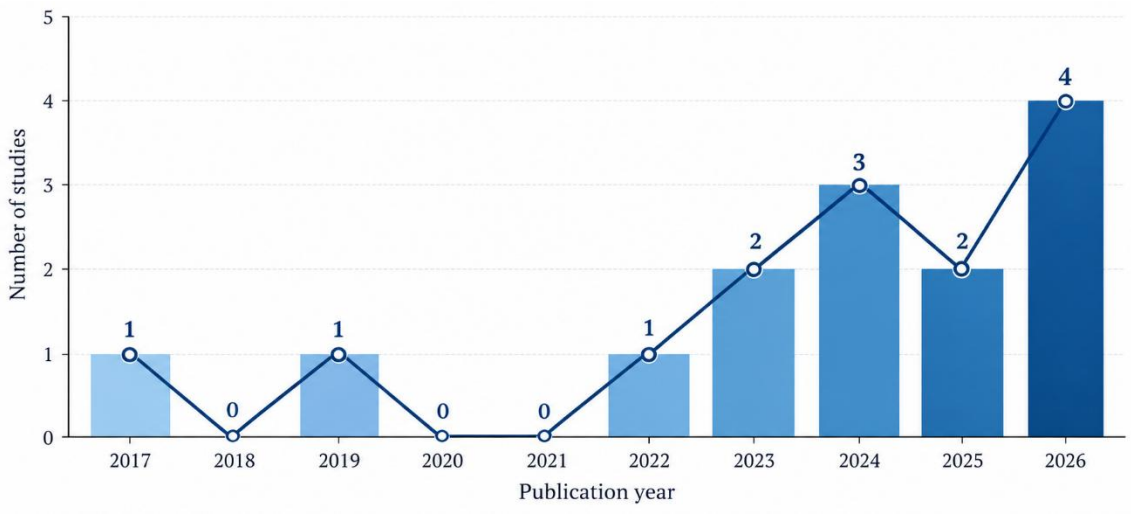
Publications, 2024–2026	9 (64.3%)	Most of the output is very recent.
English-language papers	10 (71.4%)	Predominance of international circulation in English.
Spanish-language papers	4 (28.6%)	Relevant but minority contribution from Ibero-American literature.
Unique authors	39	No recurring authors were observed in the corpus.
Mean authors/document	2.79	Moderate collaboration.
Multi-authored papers	10 (71.4%)	Co-authorship is the dominant pattern.
Different journals	14	High dispersion; no core journal emerged in this corpus.
Quantitative/comparative designs	7 (50.0%)	Empirical designs predominate, mainly surveys and correlational studies.
Qualitative/conceptual with evidence	3 (21.4%)	Provide frameworks and contextual understanding.
Systematic reviews	2 (14.3%)	Evidence syntheses remain scarce.
Conceptual/thematic syntheses	2 (14.3%)	Help model emerging domains, especially AI and innovation.

Temporal evolution

The literature shows a clear recent concentration. Only two studies were published before 2022; from that year onward, publication became continuous and peaked in 2026, with four documents. Nine of the 14 studies (64.3%) were published between 2024 and 2026, confirming that discussion of emerging competencies among school leaders has intensified alongside the consolidation of digital transformation and the rise of generative AI.

Figure 2

Temporal evolution of the included scientific production

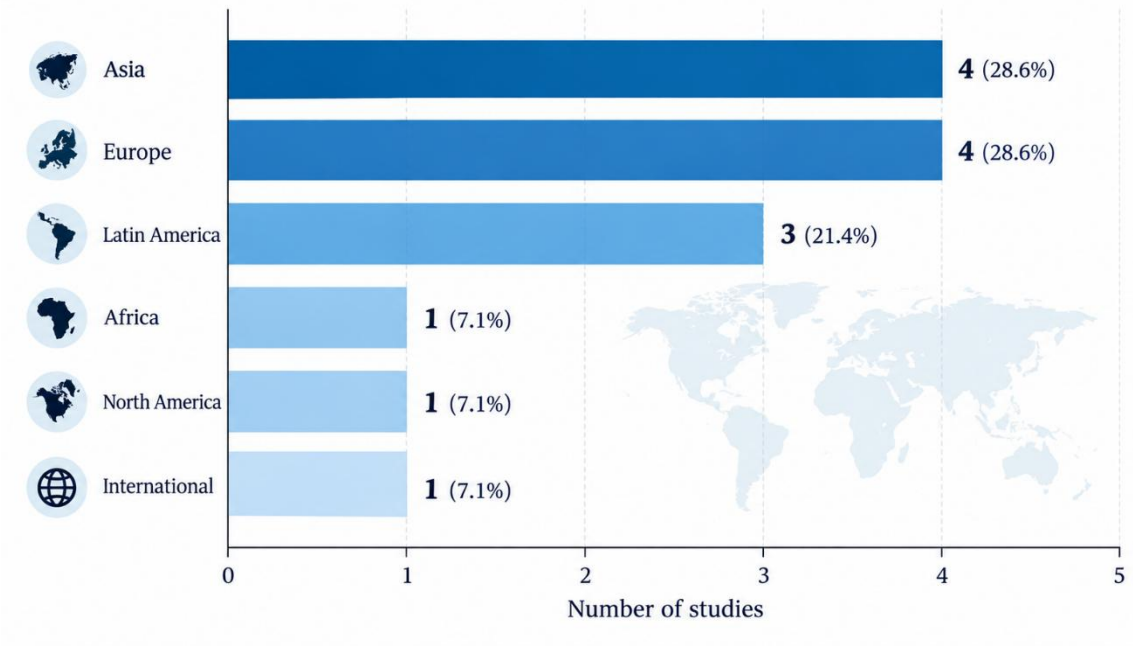


Note. The publication year of each article was used. The highest annual output occurred in 2026 (n = 4)

Geographic and linguistic distribution

Four investigations were conducted in Europe and Asia, three in Latin America, and one each in Africa and North America. In addition, one study with an international focus was included. Overall, the distribution reflects global interest, although representation from Latin America remains limited. The records identified in the region were from Peru and Venezuela. One study consolidated Latin American evidence. No cumulative line of Peruvian research explicitly focused on the digital or AI competencies of basic-education school administrators was identified in the final corpus.

Figure 3
Geographic distribution of the analyzed corpus



Note. The "International" category refers to a systematic review without a single national context. "North America" refers to the K–12 AI leadership framework developed in the United States

Regarding language, ten papers (71.4%) were published in English and four (28.6%) in Spanish. This pattern suggests that the scientific conversation with the greatest geographic diversity circulates mainly in English, whereas Spanish-language production is concentrated on managerial competencies, emotional intelligence, innovation, and digital management in Ibero-American contexts.

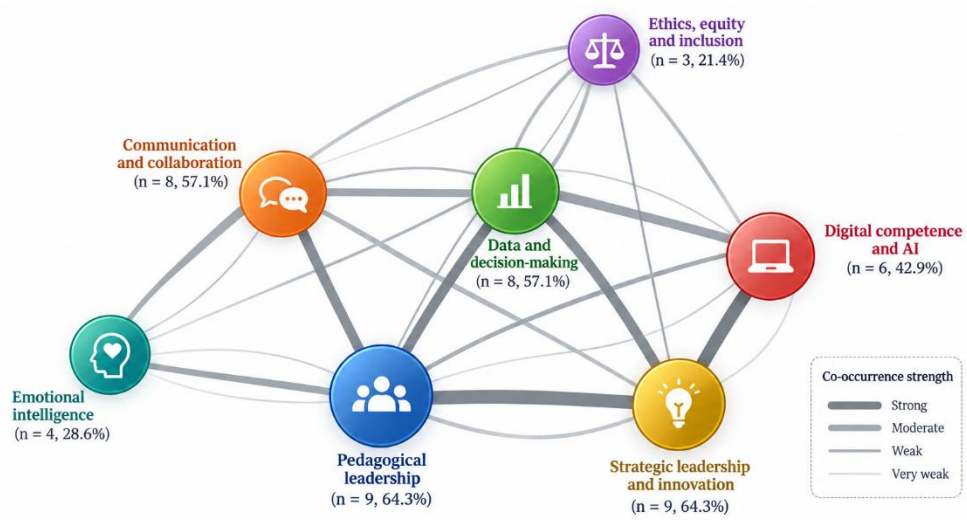
Authorship and source dispersion

The 14 papers were published in 14 separate journals, and no authors were repeated, indicating considerable dispersion. Rather than a permanent core of scholars or a dominant specialized journal, the topic is distributed across education, educational technology, administration, and leadership. This trend is consistent with the hybrid nature of the concept, which draws on traditions in school leadership, digital competence, emotional intelligence, innovation, and assessment that have historically developed in parallel and are only beginning to converge.

Emerging competency domains

Thematic coding identified seven domains. The most frequent were pedagogical leadership and strategic leadership and innovation, each present in nine studies (64.3%). Communication and collaboration, and data and decision-making followed, with eight studies each (57.1%). Digital competence and AI appeared in six studies (42.9%), emotional intelligence in four (28.6%), and ethics, equity, and inclusion in three (21.4%).

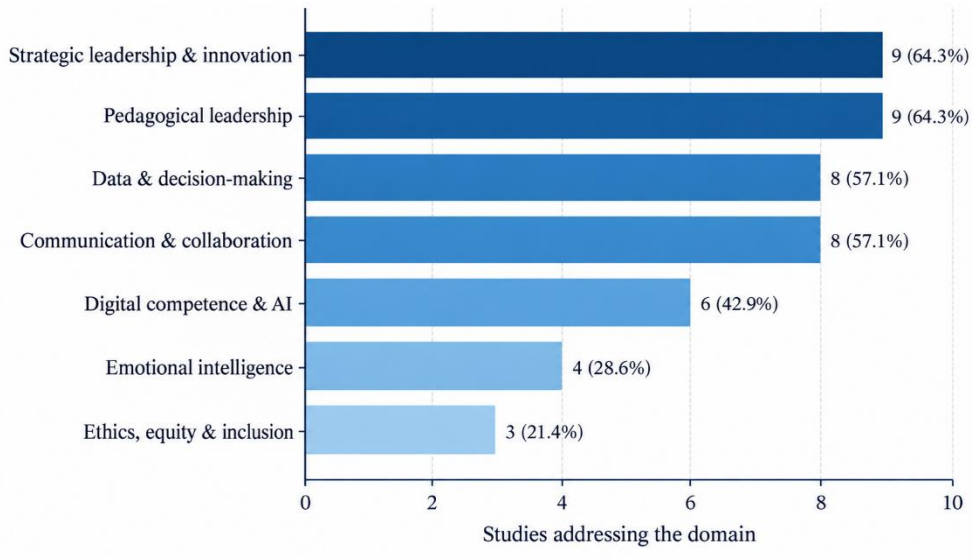
Figure 4
Co-occurrence network of emerging competency domains



Note. Node size represents frequency of occurrence; edge thickness represents the number of studies in which two domains co-occur. Coding was multilabel

The network reveals three particularly strong connections: strategic leadership–pedagogical leadership (six co-occurrences), strategic leadership–data and decision-making (six), and digital competence/AI–data and decision-making (five). This pattern indicates that digitalization does not function as an autonomous domain; rather, it is integrated with the capacity to guide the organization, solve problems, and translate information into decisions. Communication and collaboration also connect with pedagogical leadership in five studies, reinforcing the social and relational character of school management.

Figure 5
Frequency of the domains identified in the corpus



Note. Percentages are calculated using n = 14. A single article may contribute to more than one domain

Table 5
Competency domains and representative evidence

Domain	n (%)	Synthesized content	Representative studies
Pedagogical leadership	9 (64.3%)	Supervision and improvement of teaching, curriculum coordination, learning monitoring, teacher development, and pedagogical guidance.	Ayub et al. (2025); Tømte (2024); Venter et al. (2024)
Strategic leadership and innovation	9 (64.3%)	Vision, planning, change management, innovation, digital transformation, and organizational leadership.	Rauseo et al. (2023); DeMatthews et al. (2026); Abunaser et al. (2025)
Communication and collaboration	8 (57.1%)	Teamwork, family and community participation, interpersonal relationships, coordination, and stakeholder co-creation.	Crisol-Moya et al. (2022); Mugabekazi et al. (2026); Abunaser et al. (2025)
Data and decision-making	8 (57.1%)	Problem solving, assessment, information use, professional judgment, monitoring, and evidence-informed decisions.	Ayub et al. (2025); Nimkrathok & Boonchan (2026); Hsieh (2026)
Digital competence and AI	6 (42.9%)	Strategic technology use, security, infrastructure, digital literacy, AI leadership, and AI-assisted assessment.	Tømte (2024); DeMatthews et al. (2026); Nimkrathok & Boonchan (2026)
Emotional intelligence	4 (28.6%)	Self-awareness, self-regulation, empathy, emotion management, resilience, and relationships for leadership.	Montoya (2017); Venter et al. (2024); Mugabekazi et al. (2026)
Ethics, equity, and inclusion	3 (21.4%)	Justice, inclusion, ethical governance, privacy, AI equity, and participation of diverse groups.	Crisol-Moya et al. (2022); DeMatthews et al. (2026); Hsieh (2026)

Synthesis of empirical and conceptual findings

Quantitative studies show consistent associations between leadership capacities and management outcomes. In Indonesia, instructional leadership contributed significantly to 21st-century competencies, with particular emphasis on vision, critical thinking, and problem-solving (Ayub et al., 2025). In South Africa, higher levels of emotional intelligence were associated with stronger instructional supervision, curriculum coordination, and monitoring of student progress (Venter et al., 2024). In Thailand, technology use, security, and digital content creation jointly explained 55.1% of the variance in school-management effectiveness (Nimkrathok & Boonchan, 2026).

Research on digital transformation likewise shows that infrastructure alone is insufficient. In Swiss vocational schools, school leaders and teachers differed in their assessments of strategy, leadership, pedagogical support, competencies, and culture, highlighting the importance of aligning perceptions and change processes (Rauseo et al., 2023). In Peru, digital competencies and school management explained a significant proportion of teacher performance (Huapaya et al., 2023), suggesting an indirect organizational influence of leadership on pedagogical practice.

Conceptual and qualitative research extends this understanding. School leaders need professional digital competence for both administrative and instructional tasks, including strategy, infrastructure, security, and enhancing teachers' skills (Tømte, 2024). Abunaser et al. (2025) state that some of the most important competencies include strategic planning, problem-solving, interpersonal relationships, and communication. DeMatthews et al. (2026) contend that AI represents an essential leadership need requiring foresight, educational progress, justice, and moral oversight. Hsieh (2026) shows that artificial intelligence may be used to support the formative evaluation of aspiring principals; nevertheless, differences between human and algorithmic evaluations require the exercise of professional judgment.

Discussion

From school administration to hybrid leadership

The main finding is that emerging competencies do not replace established leadership abilities; rather, they reconfigure them. Administrative management remains necessary but is no longer sufficient. The most common

domains are pedagogical leadership and strategic leadership, which are related to communication, decision-making, and digital competence. This pattern supports a hybrid vision of the school leader as a leader of learning, an organizational strategist, a relationship facilitator, and a technological mediator.

This convergence helps explain why the literature does not have a single dominant framework. Critical thinking and problem-solving are prominent in studies of 21st-century competencies (Ayub et al., 2025). Strategy, security, and infrastructure are added in digital-competence proposals (Tømte, 2024). Planning, communication, and relationship-building are central to core-competency frameworks (Abunaser et al., 2025). Collectively, these contributions address different aspects of the same challenge: managing schools in times of rapid change.

Technology gains meaning when connected to pedagogy and decision-making

In the co-occurrence network, the strongest links for digital competence and AI are with data and decision-making and strategic leadership. This association is consistent with Nimkrathok and Boonchan (2026), who found that the strategic use of technology predicts managerial performance, and with Rauseo et al. (2023), who found that digital transformation depends on strategy, leadership, culture, and pedagogical support. Thus, leadership-development approaches that emphasize tools alone risk producing instrumental literacy without transformational potential.

AI intensifies this need. DeMatthews et al. (2026) argue that its integration requires attention to justice, governance, co-creation, and responsibility. Hsieh (2026) further shows that a generative tool may be consistent while employing an evaluative logic that differs from human judgment. The emerging challenge is therefore not merely to "know how to use AI," but to decide when it should be used, how it should be audited, which data may be handled, and under what conditions human judgment must prevail.

Socioemotional competencies as leadership infrastructure

Although emotional intelligence appears in fewer publications than the strategic or digital domains, its conceptual importance is transversal. Venter et al. (2024) identified a positive relationship with instructional leadership; Mugabekazi et al. (2026) discussed it as a broadly relevant competency influenced by culture, administrative workload, and opportunities for professional development; and Montoya (2017) found that socioemotional weaknesses affect trust, collaboration, and decision-making. From a professional-development perspective, these findings indicate that technological competencies should be developed alongside self-regulation, empathy, communication, and change-management skills.

Regional gaps and priorities for Latin America

Latin America contributed three studies to the corpus, although only some of this evidence directly addresses school leaders in basic education. The Peruvian literature addressed regional-level managerial competencies and the relationship between digital management and teacher performance (Huapaya et al., 2023; Vega-Armas & Romero-Carazas, 2024), but it does not yet constitute a cumulative research line on digital competence, AI literacy, data governance, or the evaluation of principals in public schools. This gap is significant because frameworks developed in Europe, Asia, or North America must be contextually validated before being transferred.

The future agenda for Latin America should include instruments specifically designed for basic-education school leaders, longitudinal research, multilevel designs linking leadership competencies with teacher and student outcomes, and evaluations of professional-development programs. There is also a need to examine how connectivity gaps, institutional capacity, and legislation affect the practical potential for exercising digital and AI leadership ethically.

Implications for leadership development and education policy

The findings support a practical leadership-development framework organized around four integrated dimensions. First, a pedagogical dimension focused on supervision, curriculum, instructional support, and learning improvement. Second, a strategic-digital dimension encompassing planning, innovation, change management, data, security, and AI. Third, a socioemotional-relational dimension centered on communication, collaboration, empathy, conflict resolution, and community building. Fourth, an ethical-governance dimension incorporating privacy, equity, transparency, inclusion, and accountability.

This framework avoids two common reductions: treating digital transformation as merely instrumental training and treating leadership as a set of decontextualized skills. Evidence from the corpus indicates that emerging competencies generate greater value when they are taught and assessed in authentic situations involving decision-making, pedagogical support, team management, and the resolution of institutional problems.

Table 6
Priority research agenda derived from the identified gaps

Gap	Priority question	Suggested design
Scarcity of leader-specific instruments	Which dimensions validly measure digital and AI competence among basic-education school leaders?	Psychometric development/validation; factor analysis; measurement invariance.
Limited causal or longitudinal evidence	How do leadership competencies change after professional-development programs, and which effects persist over time?	Quasi-experiments, cohorts, and longitudinal designs.
Weak linkage to school outcomes	Which competencies predict improvements in teaching, institutional climate, innovation, and learning?	Multilevel models and structural equation modeling.
Early-stage AI governance	How do school leaders balance efficiency, privacy, transparency, equity, and professional judgment?	Comparative case studies and mixed methods.
Latin American underrepresentation	How does the profile of emerging competencies vary by resources, regulation, and digital gaps?	Multicenter comparisons in urban and rural public schools.

Limitations

The main limitation is that the analysis is based on a closed corpus of PDF files rather than on a complete bibliographic export from Scopus, Web of Science, or another database. Consequently, it was not methodologically valid to calculate citation counts, corpus *h*-index, bibliographic coupling, co-citation, or exhaustive networks of institutions and countries. The results accurately describe the available documents but should not be interpreted as a census of all global scientific production on the topic.

A second limitation concerns conceptual and methodological heterogeneity. Some studies directly examine school principals, whereas others synthesize leadership competencies or propose conceptual frameworks. Multilabel coding reduces part of this heterogeneity, although it necessarily introduces an interpretive component. Finally, the corpus is too small for the stable application of classical bibliometric laws of productivity or concentration. These limitations do not invalidate the mapping undertaken, but they support replication using a normalized metadata file and a documented search equation when an exhaustive international bibliometric study is intended.

Conclusions

The analyzed literature shows that the contemporary profile of school leaders in basic education is shifting toward a combination of pedagogical leadership, strategic vision, innovation, collaboration, evidence-informed decision-making, and digital competence. Technologies and AI do not constitute a separate axis; instead, they connect with pedagogical and organizational leadership, so their value depends on leaders' ability to translate them into decisions, institutional culture, and educational improvement.

The increase in publications between 2024 and 2026 confirms that this is a rapidly expanding field. However, dispersion across 14 journals, the absence of recurring authors, and the diversity of conceptual labels indicate a scientific structure that remains fragmented. At the same time, this fragmentation creates an opportunity to build an integrative framework of emerging competencies specifically oriented toward school leaders.

The synthesis suggests that such a framework should include seven domains: pedagogical leadership; strategic leadership and innovation; communication and collaboration; data and decision-making; digital competence and AI; emotional intelligence; and ethics, equity, and inclusion. In Latin America, the priority is to move from broad diagnoses toward cumulative evidence on basic-education school leaders through validated instruments, longitudinal studies, and evaluations of professional-development programs. Such an agenda would make it possible to connect leadership development with concrete processes of school transformation and with SDG 4, particularly in public systems characterized by technological and institutional gaps.

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